PERFORMANCE REPORT

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FEDERAL AID PROJECT F-221-M-3

INLAND FISHERIES DIVISION MONITORING AND MANAGEMENT PROGRAM

2012 Fisheries Management Survey Report

Bonham City Reservoir

Prepared by:

John Moczygemba, Assistant District Management Supervisor
and
Bruce Hysmith, District Management Supervisor

Inland Fisheries Division
District 2-A, Pottsboro, Texas

Carter Smith
Executive Director

Gary Saul
Director, Inland Fisheries

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TABLE OF CONTENTS

SURVEY AND MANAGEMENT SUMMARY

Fish populations in Bonham City Reservoir were surveyed in 2012 using electrofishing and trap netting and in 2013 using gill netting. Habitat and aquatic vegetation was surveyed in 2012. Historical data are presented with the 2012-2013 data for comparison. This report summarizes the results of the surveys and contains a management plan for the reservoir based on those findings.

- **Reservoir Description:** Bonham City Reservoir, a 1,020-acre impoundment on Timber Creek, a tributary to Bois d'Arc Creek, which is a tributary to the Red River in Fannin County Texas. From May 2009 to April 2013 water level stayed within 2 feet of conservation level (565 ft-msl) most of the time except during the fall of 2011 (560.3 ft-msl) and 2012 (561 ft-msl). The reservoir has high nutrient productivity. Habitat features consisted of bulkhead, rip-rap, and native submerged and emergent aquatic vegetation.

- **Management History:** Important sport fish include Blue and Channel Catfish, Largemouth Bass, and White and Black Crappie. Management recommendations included stocking Blue Catfish fingerlings, supplemental sampling for White Crappie, and recommendation to clean the dam of excessive terrestrial vegetation. From 2009 to 2011 264,253 Blue Catfish fingerlings were stocked.

- **Fish Community**

  - **Prey species:** Electrofishing catch rate of Gizzard Shad was high. The relative abundance of prey-size Gizzard Shad (≤7 inches) was high and much improved from 2008. Threadfin Shad catch remains high. Bluegill catch rate remained excellent.

  - **Catfishes:** Gill net catch rate of Blue Catfish was highest on record, probably due to the stockings from 2009-2011. Legal size Blue Catfish made up 71% of the sample population and in good condition. Growth was good and recruitment of the stocked fish was good.

    Gill net catch rate of Channel Catfish was good, but has declined over the previous eight years. Most of the sample population was legal size and in good condition. Growth was good and there was recruitment.

  - **White Bass:** White Bass were collected for the first time when three mature females were collected in gill nets. Their effect on the other sportfishes is uncertain.

  - **Black basses:** Spotted Bass are present in the reservoir. Electrofishing catch rate of Largemouth Bass has declined. The structure of the sample population was good with 20% of the sample population being legal, growth was good, and the bass were in good condition and recruitment was high.

  - **Crappie:** Trap net catch rate of White Crappie rebounded from the last survey with the highest catch rate since 2004. Legal-size White Crappie made up 35% of the sample population. Condition was excellent for most individuals. Growth was good.

    The trap net catch rate of Black Crappie was low. Condition was excellent for most individuals.

- **Management Strategies:** Based on current information, Bonham City Reservoir should continue to be managed with existing fish harvest regulations. The controlling authority will be informed of excessive terrestrial growth on dam and erosion of edges of north public boat ramp. A gill netting survey will be conducted in 2015 to check the status of the White Bass population. The City of Bonham will be informed about new exotic species threats to Texas waters, and work with them to display appropriate signage and educate constituents. General monitoring with electrofisher, trap nets, and gill nets will be conducted in 2016-2017.

INTRODUCTION

This document is a summary of fisheries data collected from Bonham City Reservoir in 2012–2013. The purpose of the document is to provide fisheries information and make management recommendations to protect and improve the sport fishery. While information on other species of fishes was collected, this report deals primarily with major sport fishes and important prey species. Historical data are presented with the 2012–2013 data for comparison.

Reservoir Description

Bonham City Reservoir, a 1,020-acre impoundment on Timber Creek, is located northeast of Bonham in Fannin County. It was constructed in 1969 by the City of Bonham for municipal and industrial uses. The reservoir drains approximately 29 square miles and has a shoreline 18 miles. Approximately 65% of the reservoir is ≤15 feet deep. Water level fluctuation from May 2009 until April 2013 is presented in Figure 1 (conservation elevation 565 ft-msl). With a TSI (Secchi Disc; SD) of 48.17, Bonham City Reservoir was eutrophic (Texas Commission on Environmental Quality 2008). A TSI (SD) >45 and <55 is considered eutrophic; hence, the reservoir is rich in nutrients with high productivity. The average depth is 13 feet with a maximum depth of 30 feet. Habitat features consisted mainly of bulkhead, rip-rap, and native submerged and emergent aquatic vegetation. Other descriptive characteristics for Bonham City Reservoir are in Table 1.

Angler Access

Boat access consisted of two public boat ramps with lighted parking. Additional boat ramp characteristics are in Table 2. The north ramp shows signs of washing around the edges. Addition of rip-rap could correct the situation. The City of Bonham requires an annual $10 boat-use fee for the reservoir. Much of the perimeter of Bonham City Reservoir is privately owned, occupied by homes with boat docks. However, there is an interspersion of bank access, especially adjacent to the public boat ramps. Further information about Bonham City Reservoir and its facilities can be obtained by visiting the Texas Parks and Wildlife Department (TPWD) web site at www.tpwd.state.tx.us and navigating within the fishing web page.

Management History

Previous management strategies and actions: Management strategies and actions from the previous survey report (Hysmith and Moczygemba 2009) included:

1. Stock Blue Catfish fingerlings annually at 25/acre from 2009 - 2011. Assess recruitment during mandatory monitoring in 2013.
   Action: Blue Catfish fingerlings were stocked annually from 2009 – 2011 at 50 to 108 per acre. Recruitment was assessed during spring gill netting in 2013. The stocked Blue Catfish greatly enhanced the population structure.
2. Trap net CPUE of White Crappie was lowest on record. There were too few fish for meaningful relative weight and age and growth.
   Action: Conducted supplemental trap netting in 2010 and collected otoliths from White Crappie. The CPUE for White Crappie was adequate. Relative weights were good and White Crappie grew to 10-inches in 2 years (N=13).
3. Dam stability may be threatened due to excessive terrestrial vegetation.
   Action: The City of Bonham was advised to remove vegetation and install as fish habitat into Bonham City Reservoir. To date nothing has been done.

Harvest regulation history: Sport fishes in Bonham City Reservoir are currently managed with statewide regulations (Table 3).

Stocking history: Bonham City Reservoir was stocked with fingerling Blue Catfish from 2009 to 2011 at 50 to 108 per acre (Table 4). Florida Largemouth Bass were last stocked in 1998.

Vegetation/habitat management history: Bonham City Reservoir habitat features consisted mainly of open water with some bulkhead and rip-rap (Table 5). The reservoir supported native submerged and emergent aquatic vegetation (Table 6).

Water transfer: No inter-basin transfers are known to exist. The City of Bonham has transferred the water rights of Bonham Reservoir to the North Texas Municipal Water District (NTMWD) and NTMWD owns and operates the water plant (formerly the City of Bonham's) to provide water to customers in the City of Bonham. There are no plans to transfer water in or out of Bonham Reservoir.

METHODS

Fishes were collected by electrofishing (1 hour at 12, 5-min stations), gill netting (5 nn at 5 stations), and trap netting (5 nn at 5 stations). Catch per unit effort (CPUE) for electrofishing was recorded as the number of fish caught per hour (fish/h) of actual electrofishing and, for gill and trap nets, as the number of fish caught per net night (fish/nn). All survey sites were randomly selected and all surveys were conducted according to the Fishery Assessment Procedures (TPWD, Inland Fisheries Division, unpublished manual revised 2011).

Sampling statistics (CPUE for various length categories) and structural indices [Proportional Size Distribution (PSD)] as defined by Guy et al. (2007) and condition indices [relative weight (W_r)] were calculated for target fishes according to Anderson and Neumann (1996). Index of vulnerability (IOV) was calculated for Gizzard Shad (DiCenzo et al. 1996). Relative standard error (RSE = 100 X SE of the estimate/estimate) was calculated for all CPUE statistics and SE was calculated for structural indices and IOV. Otoliths were used for aging Blue Catfish, Channel Catfish, Largemouth Bass, and White Crappie according to the Fishery Assessment Procedures (TPWD, Inland Fisheries Division, unpublished manual revised 2011). Ages were determined using Tier 2 protocol according to the Fishery Assessment Procedures (TPWD, Inland Fisheries Division, unpublished manual revised 2011). The manual specifies procedures for Largemouth Bass only, but we adapted the protocol to other target fishes for identifying the number and size(s) of target fish to sample. The source for water level data was the United States Geological Survey website.

Genetic analysis of Largemouth Bass was conducted according to the Fishery Assessment Procedures (TPWD, Inland Fisheries Division, unpublished manual revised 2011). Micro-satellite DNA analysis was used to determine genetic composition of individual fish from 2012-2013 and by electrophoresis for previous years.

RESULTS AND DISCUSSION

Habitat: Littoral zone habitat consisted primarily of rocky shoreline, bulkhead, and natural shoreline (Table 5). Native submersed (muskgrass) and native emergent (common cattail) aquatic vegetation covered about 20 percent of the reservoir's surface area (Table 6). Excessive growth of young trees was once again observed on the dam and may compromise dam stability in the future.

Prey species: Electrofishing CPUE of Gizzard Shad and Bluegill was 400.0/h and 373.0/h, respectively (Figures 2 and 3). Gizzard Shad IOV was high, indicating 90% of the Gizzard Shad sample was available to existing predators; IOV estimates have increased each survey since 2004 (Figure 2). Total CPUE for Threadfin Shad was 2,442.0/h, which was second highest on record (Appendix C). The CPUE of Bluegill remained high and 46% of the sample population was $\leq$4 inches (Figure 3). Bonham City Reservoir has an excellent prey base.

Catfishes: Gill net CPUE of Blue Catfish was 22.6/nn (Figure 4), the catch of record (Appendix C). Relative weight was fair to good for all sizes. Blue Catfish in the sample population reached legal size in 3 years (N=13) and 71% of the sample population was legal size. The high CPUE was probably the result of annual fingerling stocking from 2009-2011. This should support the catfish fishery for years to come.

Gill net CPUE of Channel Catfish was 10.2/nn, which was near the average of 10.4/nn (Figure 5 and Appendix C). Body condition was good. Growth was good with Channel Catfish reaching legal size (12 inches) in 3 years (N= 7). Approximately 82% of the sample population was legal size and larger.

White Bass: White Bass were observed for the first time in Bonham City Reservoir, when three females were collected in gill nets (Appendix A). Since there are no White Bass populations above the reservoir and the reservoir has not gone over the emergency spillway, White Bass were probably introduced by anglers. The reservoir may or may not support another predator and their effect on the other sportfishes is uncertain.

Black basses: Only one Spotted Bass was collected in 2012 (Appendix A). However they have been collected in past surveys (Appendix C), which indicated Spotted Bass are in low abundance in Bonham City Reservoir.

Electrofishing CPUE for Largemouth Bass (85.0/h) has declined since the 2004 sample and was below the average of 122.7/h (Appendix C). Sub-stock CPUE has varied between 52.0/h and 61.0/h since 2006 (Figure 6), which indicates reproduction has been stable. The PSD of 61 was the highest of the past three surveys (Figure 6). Relative weight indicated good condition and varied from 90 to 100. The sample population showed 20% were legal size. Growth was good: 14 inches in 2 to 3 years (N = 9).

Based on DNA analysis for 30 Largemouth Bass collected in the fall of 2012, the sample population was represented genetically by 34.0% Florida Largemouth Bass alleles and no pure Florida Largemouth Bass. This was similar to the 2004 sample (Table 7). Florida Largemouth Bass were last stocked in 1998.

Crappie: Trap net catch rate of White Crappie (15.0/nn) was the highest since 2004, but a little below the average of 19.4 (Figure 7 and Appendix C). Body condition was excellent for most White Crappie. White Crappie reached legal size in 2 years (N=13). About 35% of the sample population was legal size or larger.

Trap net catch rate of Black Crappie (1.2/nn) was the second lowest on record and below the average of 4.1/nn (Figure 8 and Appendix C). Relative weight was fair to good for most sizes.

Fisheries management plan for Bonham City Reservoir, Texas

Prepared – July 2013.

ISSUE 1: Dam safety may be threatened due to excessive terrestrial vegetation.

MANAGEMENT STRATEGIES

1. Advise the City of Bonham to remove vegetation.
2. Install removed vegetation into reservoir as fish habitat.

ISSUE 2: Erosion around the edges of the north public boat ramp could cause damage to the ramp.

MANAGEMENT STRATEGIES

1. Advise the City of Bonham to install rip-rap around the eroded areas.
2. Advise the City of Bonham of possible funds available to them for the repair through TPWD boat ramp program.

ISSUE 3: White Bass were observed for the first time in Bonham City Reservoir, when three mature females were collected in gill nets. It is not known what effect these new predators will have on the reservoir, if White Bass successfully establish.

MANAGEMENT STRATEGIES

1. Monitor the status of the White Bass population with a supplemental gill netting survey in 2015.

ISSUE 4: Many invasive species threaten aquatic habitats and organisms in Texas and can adversely affect the state ecologically, environmentally, and economically. For example, zebra mussels (*Dreissena polymorpha*) can multiply rapidly and attach themselves to any available hard structure, restricting water flow in pipes, fouling swimming beaches and plugging engine cooling systems. Giant Salvinia (*Salvinia molesta*) and other invasive vegetation species can form dense mats, interfering with recreational activities like fishing, boating, skiing and swimming. The financial costs of controlling and/or eradicating these types of invasive species are significant. Additionally, the potential for invasive species to spread to other river drainages and reservoirs via watercraft and other means is a serious threat to all public waters of the state.

MANAGEMENT STRATEGIES

1. Cooperate with City of Bonham personnel to post appropriate signage at access points around the reservoir.
2. Contact and educate City of Bonham personnel about invasive species, and provide them with posters, literature, etc… so that they can in turn educate their reservoir visitors.
3. Educate the public about invasive species through the use of media and the internet.
4. Make a speaking point about invasive species when presenting to constituent and user groups.
5. Keep track of (i.e., map) any future inter-basin water transfers to facilitate potential invasive species responses.

SAMPLING SCHEDULE JUSTIFICATION:

The proposed sampling schedule consists of checking the status of White Bass population in 2015 and mandatory monitoring in 2016-2017 (Table 8).

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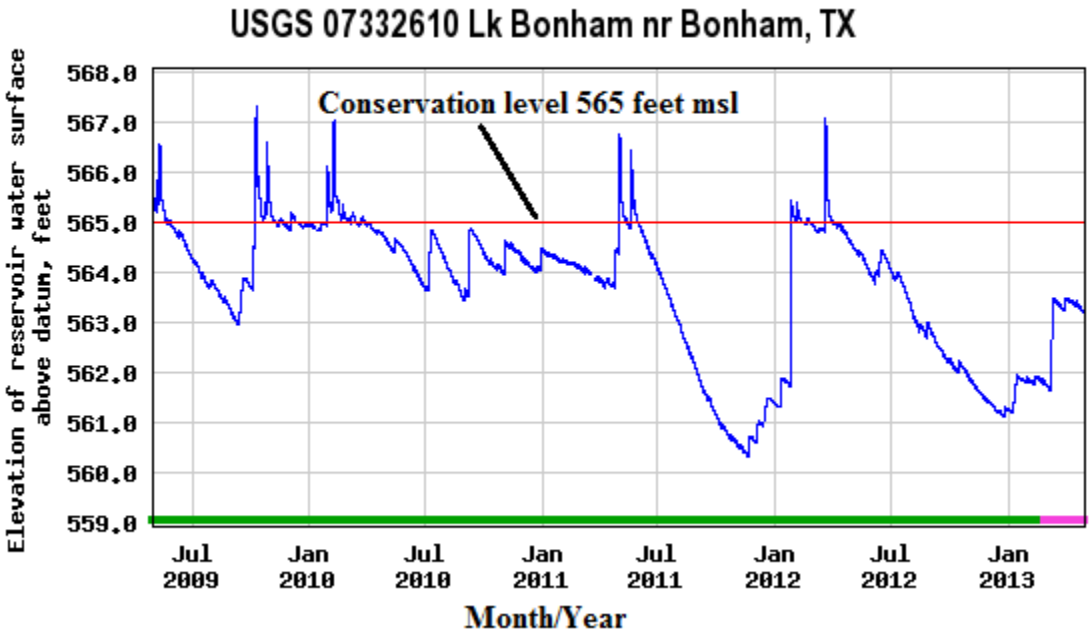


Figure 1. Water level elevations in feet above mean sea level (MSL) recorded every 15 minutes for Bonham City Reservoir, Texas, May 2009 - April 2013.

Table 1. Characteristics of Bonham City Reservoir, Texas.

Characteristic	Description
Year constructed	1969
Controlling authority	Bonham Municipal Water Authority
County	Fannin
Reservoir type	Offstream
Shoreline development index	4.1
Conductivity	123 µmhos/cm

Table 2. Boat ramp characteristics for Bonham City Reservoir, Texas, October, 2012. Reservoir elevation at time of survey was 562 feet above mean sea level.

Boat ramp	Latitude Longitude (dd)	Public	Parking capacity (N)	Elevation at end of boat ramp (ft)	Condition
South ramp	33.6461 -96.1394	Y	30	557	Excellent
North ramp	33.6573 -96.1482	Y	10	555	Needs rip rap along edges of boat ramp to prevent washing out.

Table 3. Harvest regulations for Bonham City Reservoir, Texas.

Species	Bag Limit	Length Limit
Catfish: Channel and Blue Catfish, their hybrids and subspecies	25 (in any combination)	12-inch minimum
Catfish, Flathead	5	18-inch minimum
Bass, White	25	10-inch minimum
Bass, Spotted	5[a]	None
Bass, Largemouth	5[a]	14-inch minimum
Crappie: White and Black Crappie, their hybrids and subspecies.	25 (in any combination)	10-inch minimum

[a] Daily bag for Largemouth Bass and spotted bass = 5 fish in any combination.

Table 4. Stocking history of Bonham City Reservoir, Texas. Life stages are fry (FRY), fingerlings (FGL), advanced fingerlings (AFGL), adults (ADL) and unknown (UNK). Life stages for each species are defined as having a mean length that falls within the given length range. For each year and life stage the species mean total length (Mean TL; in) is given. For years where there were multiple stocking events for a particular species and life stage the mean TL is an average for all stocking events combined.

Species	Year	Number	Life Stage	Mean TL (in)
Blue Catfish	1978	25,486	UNK	UNK
	2009	50,685	FGL	2.4
	2010	103,128	FGL	2.0
	2011	110,440	FGL	2.1
	Total	289,739		
Channel Catfish	1969	50,000	AFGL	7.9
	1994	1,634	AFGL	7.4
	Total	51,634		
Florida Largemouth bass	1996	101,900	FGL	1.5
	1997	104,206	FGL	1.4
	1998	103,324	FGL	1.4
	Total	309,430		
Largemouth Bass	1969	200,000	UNK	UNK
	Total	200,000		
Palmetto Bass (Striped X White Bass hybrid)	1978	26,313	UNK	UNK
	Total	26,313		

Table 5. Survey of structural habitat types, Bonham City Reservoir, Texas, 2012. Shoreline habitat type units are in miles and open water is in acres.

Habitat type	Estimate	% of total
Bulkhead and boat docks	3.1 miles	17.2
Gravel	0.9 miles	5.0
Natural shoreline	12.5 miles	69.4
Rocky shoreline	1.5 miles	8.4
Open water	819.7 acres	80.4

Table 6. Survey of aquatic vegetation, Bonham City Reservoir, Texas 2012. Surface area (acres) is listed with percent of total reservoir surface area in parentheses.

Vegetation	2012
Native submersed[a]	99.6 (9.8)
Native emergent[b]	100.7 (9.8)

[a]Muskgrass
[b]Common cattail

Gizzard Shad

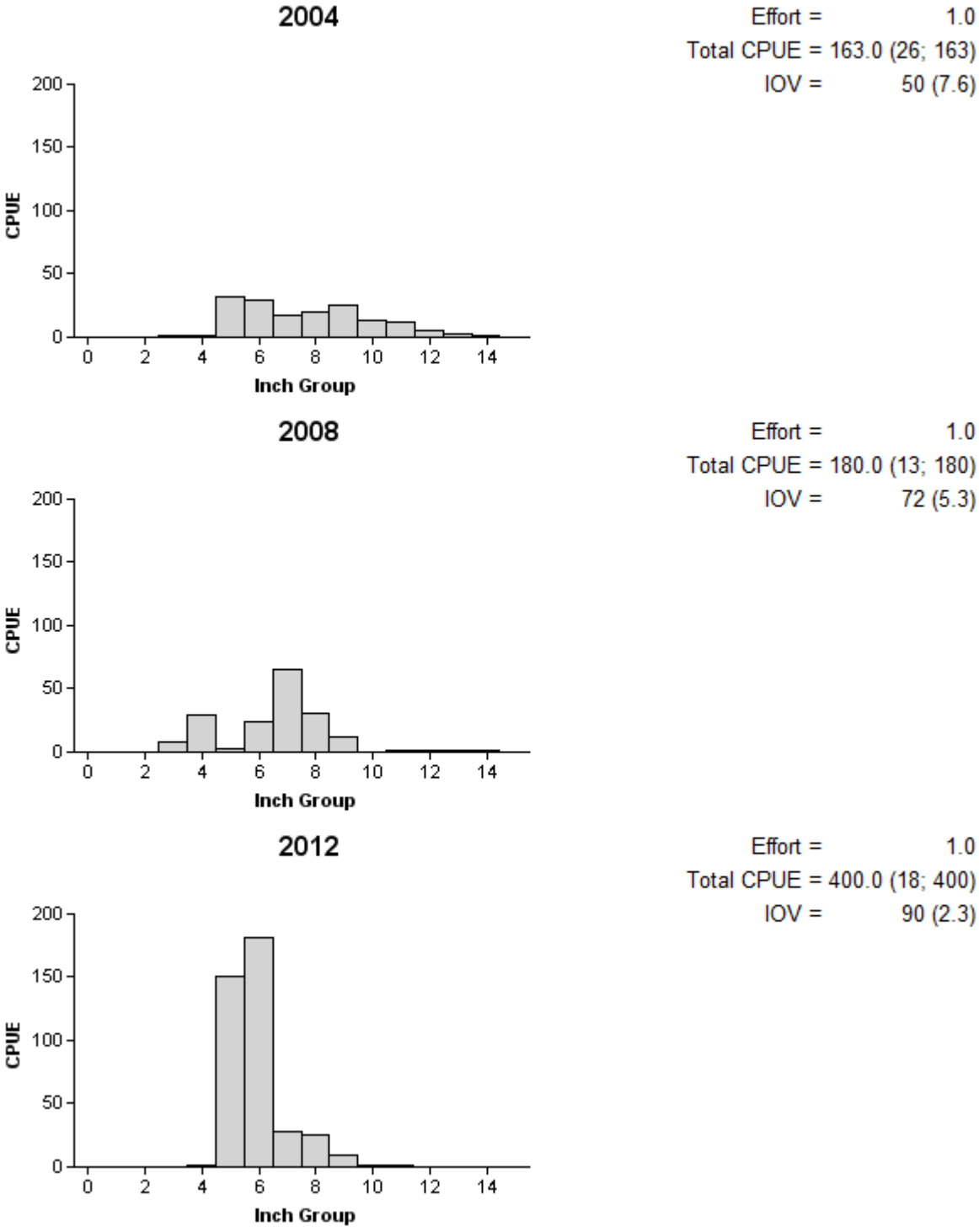


Figure 2. Number of Gizzard Shad caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for IOV are in parentheses) for fall electrofishing surveys, Bonham City Reservoir, Texas 2004, 2008, and 2012.

Bluegill

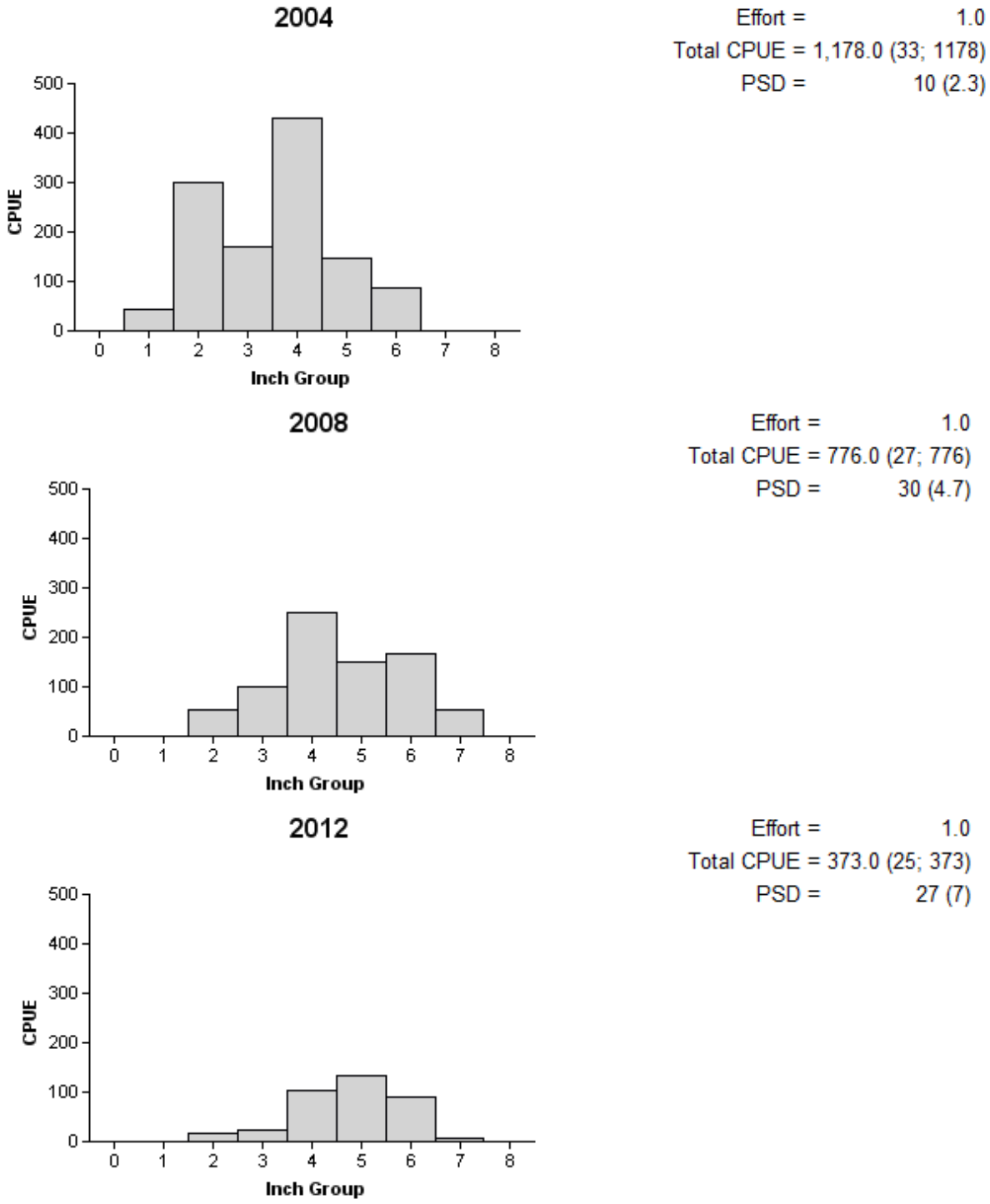


Figure 3. Number of Bluegill caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Bonham City Reservoir, Texas, 2004, 2008, and 2012.

Blue Catfish

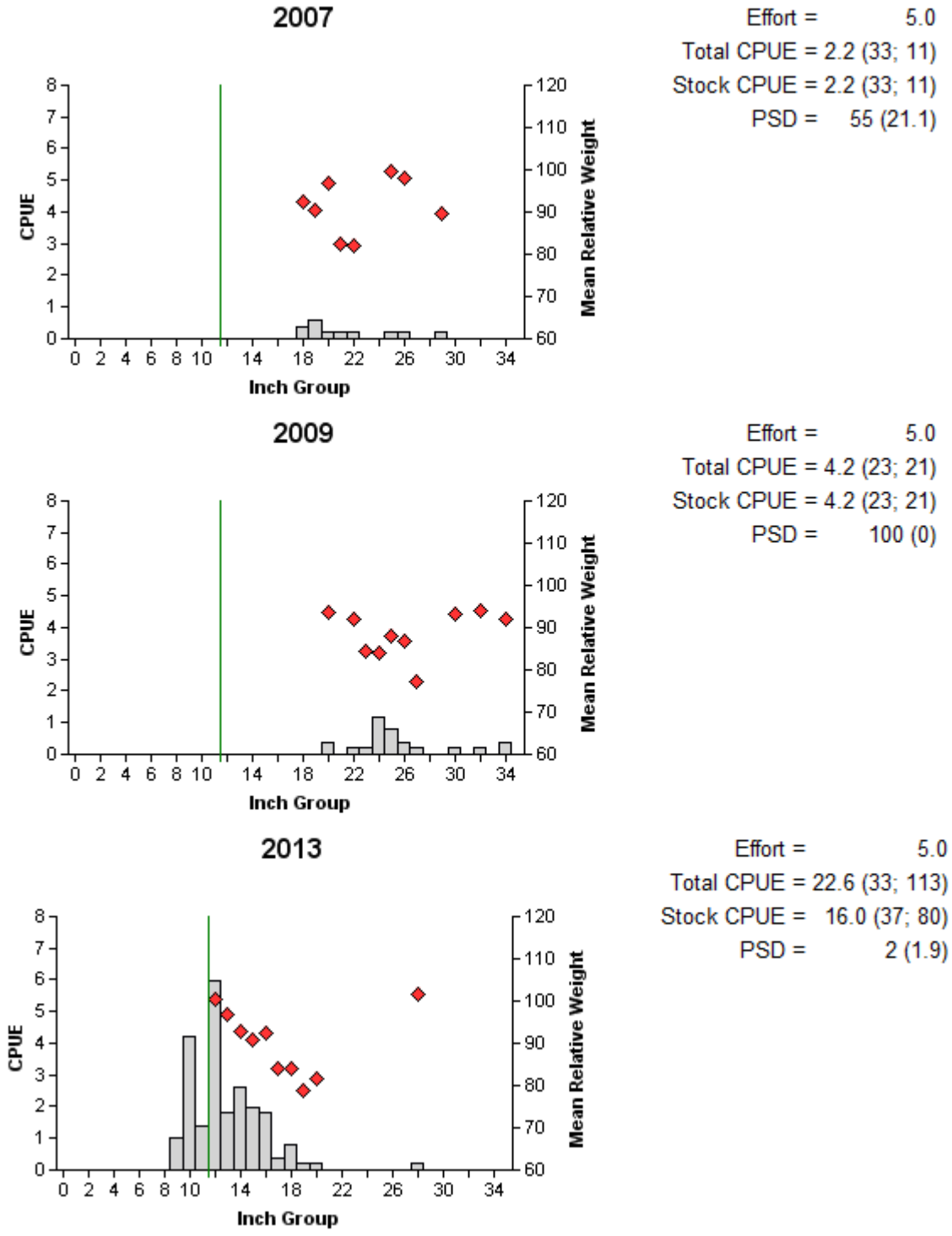


Figure 4. Number of Blue Catfish caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill net surveys, Bonham City Reservoir, Texas, 2007, 2009, and 2013. Vertical lines represent length limit at time of collection.

Channel Catfish

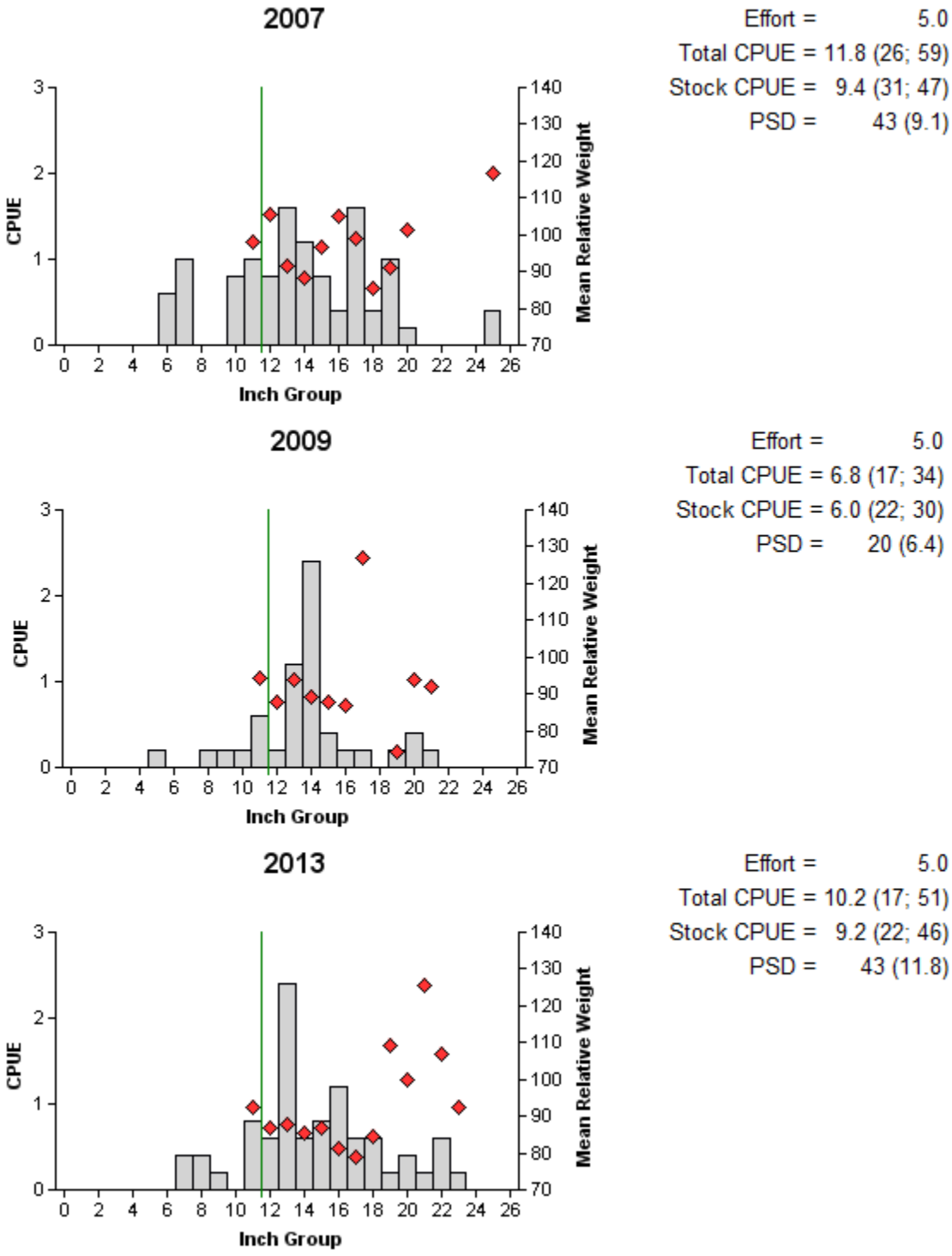


Figure 5. Number of Channel Catfish caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill net surveys, Bonham City Reservoir, Texas, 2007, 2009, and 2013. Vertical lines represent length limit at time of collection.

Largemouth Bass

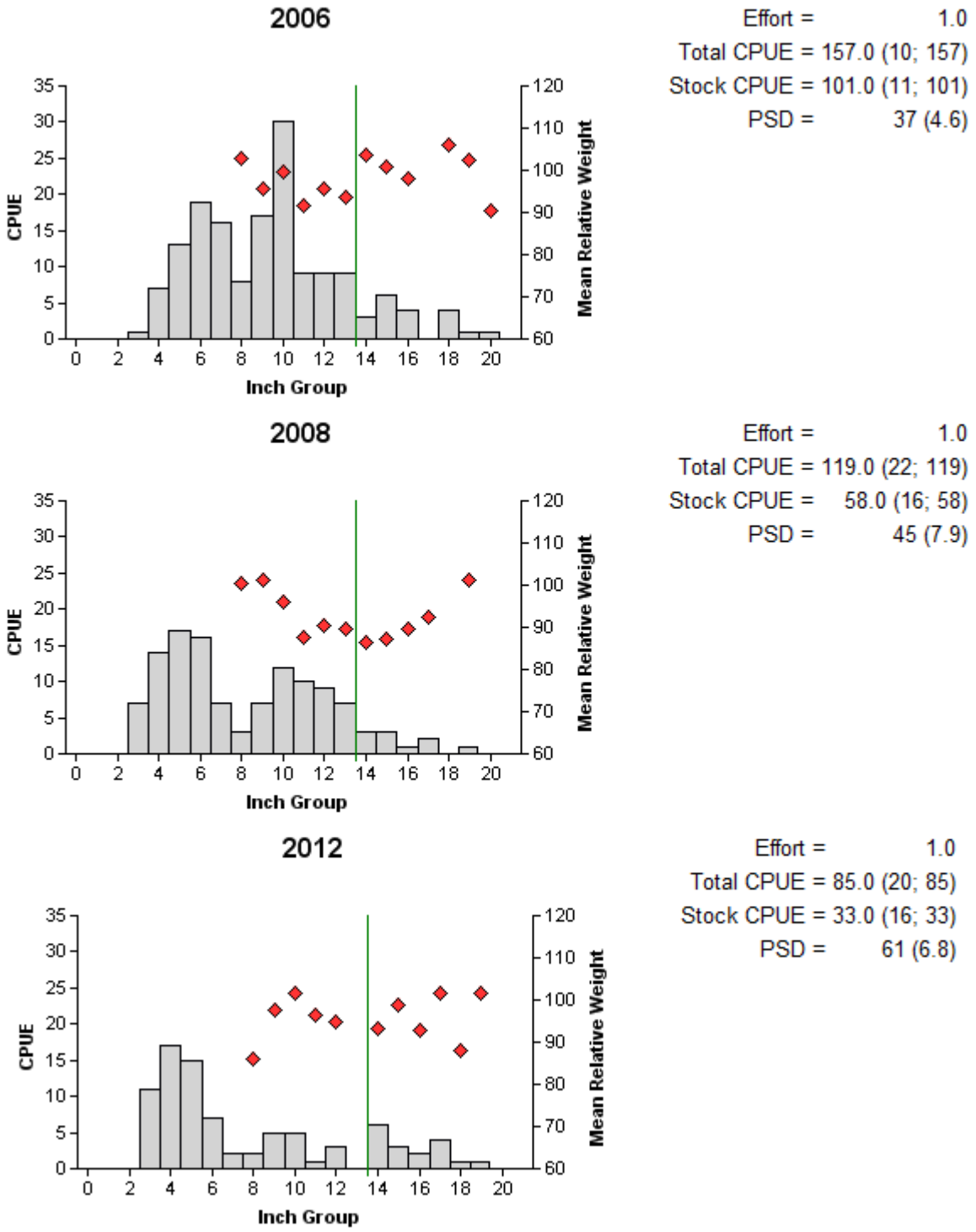


Figure 6. Number of Largemouth Bass caught per hour (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Bonham City Reservoir, Texas, 2006, 2008, and 2012. Vertical lines represent length limit at time of collection.

Largemouth Bass

Table 7. Results of genetic analysis of Largemouth Bass collected by fall electrofishing, Bonham City Reservoir, Texas, 2000, 2004, and 2012. FLMB = Florida Largemouth Bass, NLMB = Northern Largemouth Bass, Intergrade = hybrid between a FLMB and a NLMB. Genetic composition was determined by electrophoresis prior to 2005 and with micro-satellite DNA analysis since 2005.

Year	Sample size	Number of fish			% FLMB alleles	% FLMB
		FLMB	Intergrade	NLMB		
2000	29	0	4	25	6.8	0.0
2004	30	3	19	8	35.8	10.0
2012	30	0	27	3	34.0	0.0

White Crappie

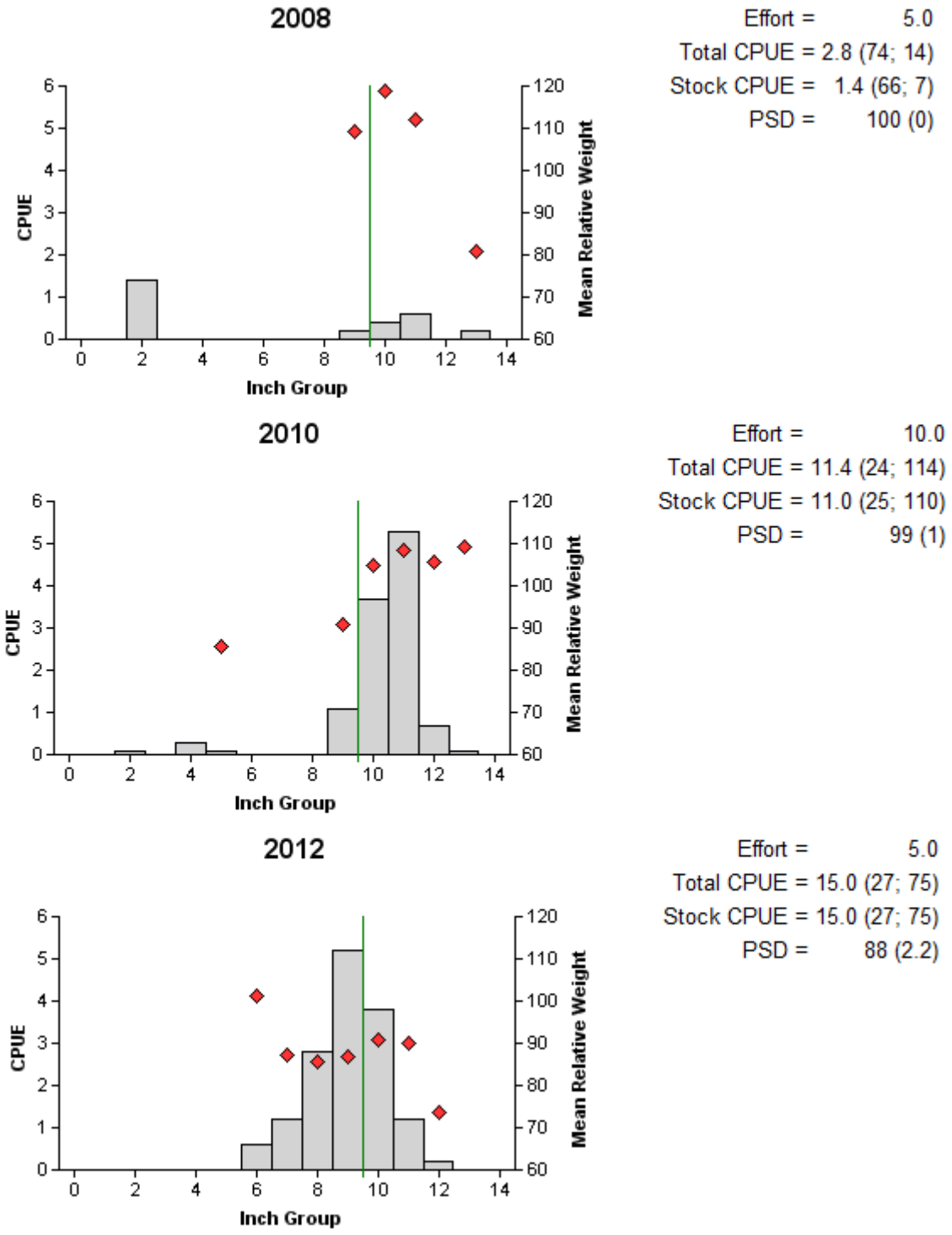


Figure 7. Number of White Crappie caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall trap netting surveys, Bonham City Reservoir, Texas, 2008, 2010, and 2012. Vertical lines represent length limit at time of collection.

Black Crappie

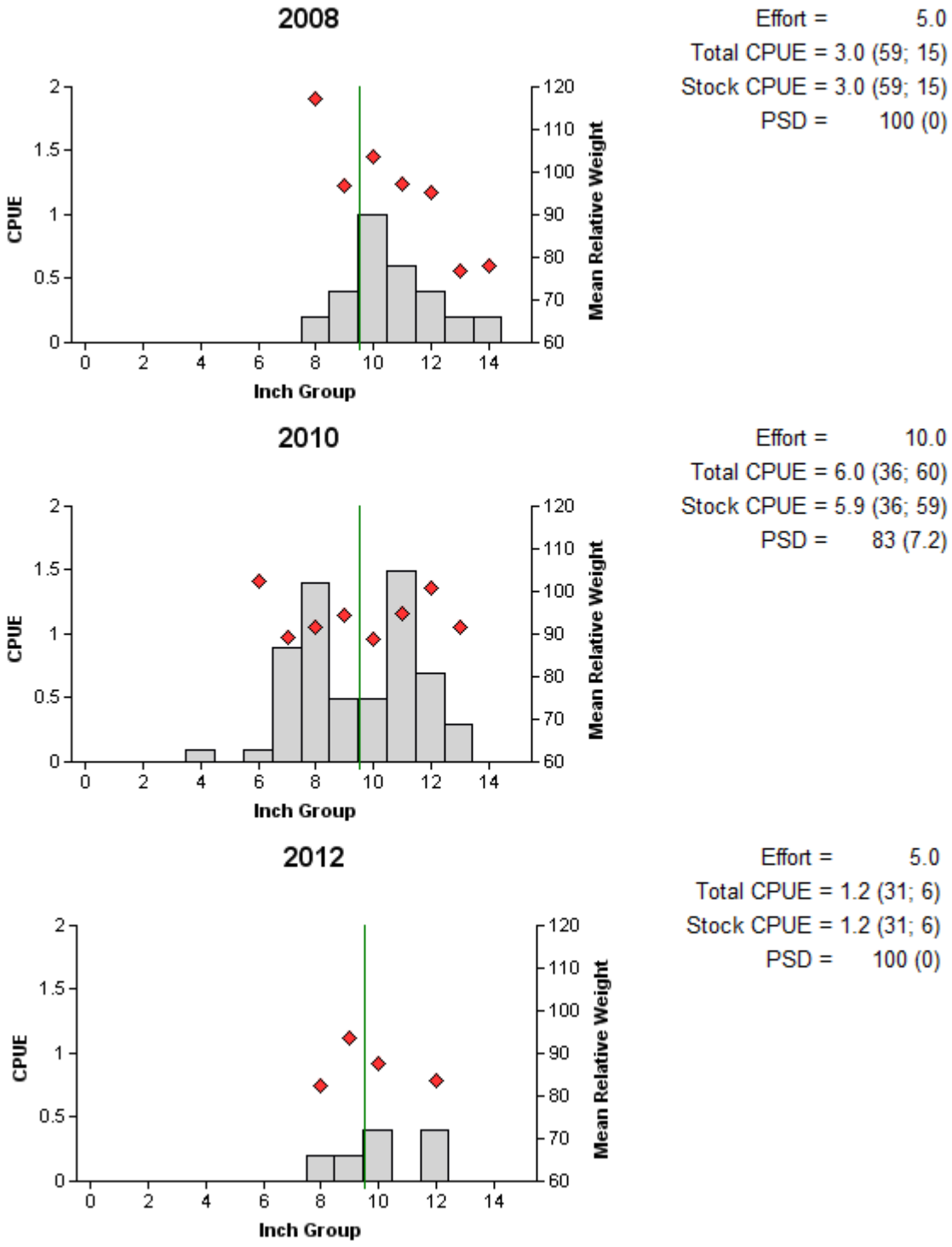


Figure 8. Number of Black Crappie caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall trap netting surveys, Bonham City Reservoir, Texas, 2008, 2010, and 2012. Vertical lines represent length limit at time of collection.

Table 8. Proposed sampling schedule for Bonham City Reservoir, Texas. Survey period is June through May. Electrofishing and trap netting surveys are conducted in the fall, while gill netting surveys are conducted during the following spring. Standard survey denoted by S and additional survey denoted by A.

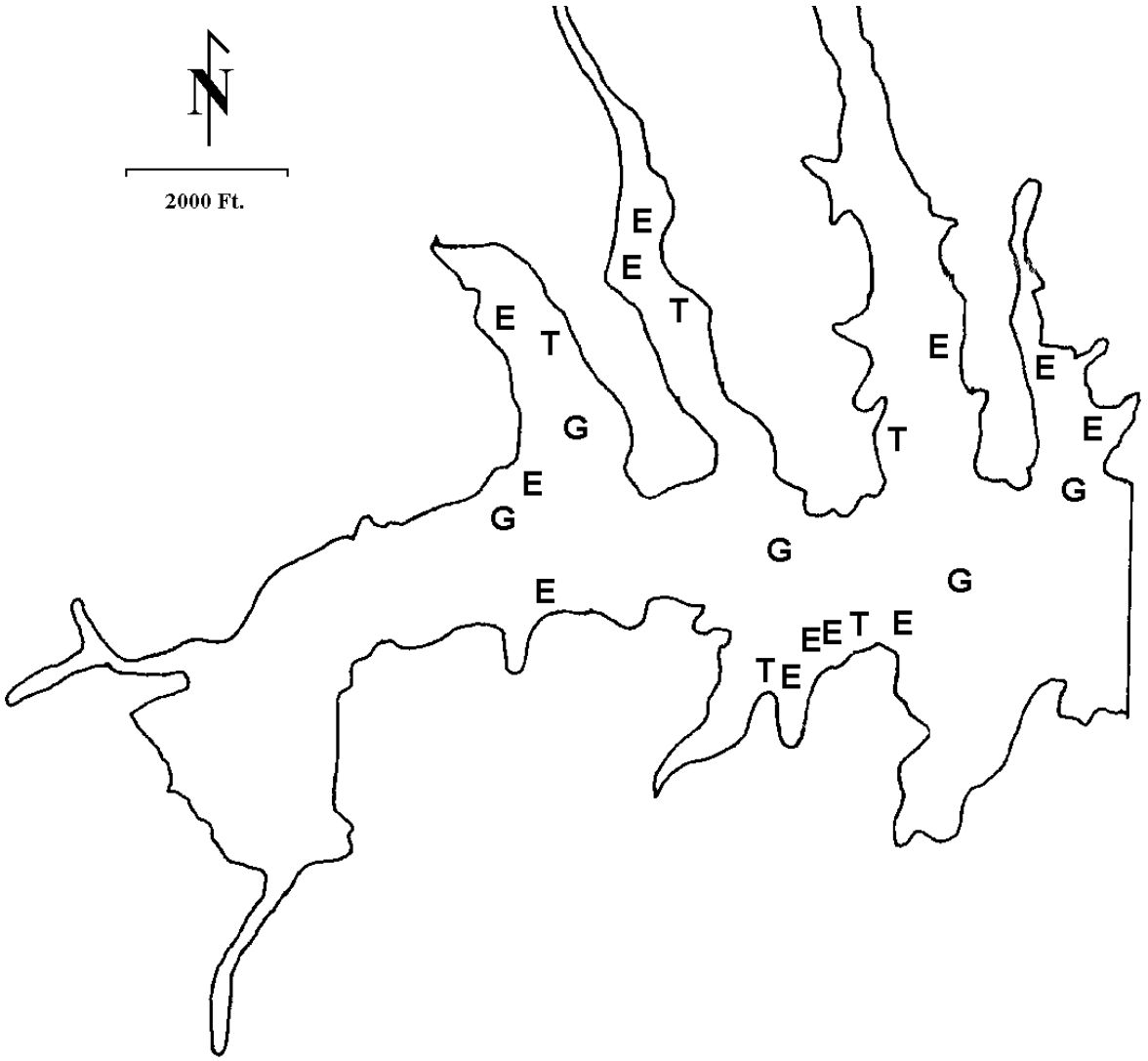
Survey year	Electrofish Fall(Spring)	Trap net	Gill net	Habitat		Access	Creel survey	Report
				Structural	Vegetation			
2013-2014								
2014-2015			A					
2015-2016								
2016-2017	S	S	S		S	S		S

APPENDIX A

Number (N) and catch rate (CPUE) of all target species collected from all gear types from Bonham City Reservoir, Texas, 2012-2013. Sampling effort was five net nights for gill and trap netting and one hour for electrofishing

	Gill Netting		Trap Netting		Electrofishing	
Species	N	CPUE	N	CPUE	N	CPUE
Gizzard Shad					400	400.0
Threadfin Shad					2442	2442.0
Blue Catfish	113	22.6				
Channel Catfish	51	10.2				
White Bass	3	0.6				
Warmouth					2	2.0
Bluegill					373	373.0
Longear Sunfish					73	73.0
Redear Sunfish					46	46.0
Spotted Bass					1	1.0
Largemouth Bass					85	85.0
White Crappie			75	15.0		
Black Crappie			6	1.2		

APPENDIX B



Location of sampling sites, Bonham City Reservoir, Texas, 2012–2013. Trap netting, gill netting, and electrofishing are indicated by E, G, and T, respectively. Water level was 3 feet below conservation level for electrofishing, 1.65 feet below conservation level during gill netting, and 3.2 feet below conservation level for trap netting.

APPENDIX C

Catch rates (CPUE) of targeted species by gear type for Bonham City Reservoir, Texas, 1997, 2000, 2001, 2004 - 2009, 2010, 2012, and 2013.

Gear	Species	Year												Avg.
		1997[a]	2000[a]	2001[a]	2004[a]	2005[a]	2006[a,b]	2007[c]	2008[a,d]	2009[a]	2010[a]	2012[a]	2013[a]	
Gill Netting	Blue Catfish	9.0		5.0		3.4		2.2		4.2			22.6	**7.7**
(fish/net night)	Channel Catfish	16.0		9.2		8.4		11.8		6.8			10.2	**10.4**
	White Bass												0.6	**0.6**
Electrofishing	Gizzard Shad	123.3	409.0		163.0				108.0			400.0		**240.7**
(fish/hour)	Threadfin Shad	392.7	777.0		3486.0				1962.0			2442.0		**1812.0**
	Green Sunfish	0.7	0.0		2.0				2.0			0.0		**0.9**
	Warmouth	12.0	28.0		35.0				0.0			2.0		**15.4**
	Bluegill	3647.0	1207.0		1178.0				776.0			373.0		**1436.2**
	Longear Sunfish	137.3	197.0		589.0				112.0			73.0		**221.7**
	Redear Sunfish	13.3	131.0		154.0				109.0			46.0		**90.7**
	Spotted Bass	6.7	12.0		7.0		10.0		2.0			1.0		**6.5**
	Largemouth Bass	124.0	79.0		172.0		157.0		119.0			85.0		**122.7**
Trap Netting	White Crappie	28.8	6.8		51.6				2.8		11.4	15.0		**19.4**
(fish/net night)	Black Crappie	0.6	3.2		10.6				3.0		6.0	1.2		**4.1**

[a] All sampling stations for all gear were randomly selected.
[b] Bass only electrofishing survey.
[c] All sampling stations for all gear were subjectively selected.
[d] Electrofishing survey was conducted using a 7.5 Smith-Root GPP (Gas Powered Pulsator). Electrofishing surveys prior to 2007 were conducted using a Smith-Root 5.0 GPP.